EAST Search History

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	9	(amorphous adj carbon) with (laser with annealing)	US-PGPUB; USPAT	OR	ON	2006/12/18 13:56
L2	3	1 and @ad<"20031003"	US-PGPUB; USPAT	OR	ON	2006/12/18 13:56
L3	1	2 and wavelength	US-PGPUB; USPAT	OR	ON	2006/12/18 14:03
L4	13	(amorphous adj carbon) same (laser with annealing)	US-PGPUB; USPAT	OR	ON	2006/12/18 14:01
L5	6	4 and @ad<"20031003"	US-PGPUB; USPAT	OR	ON	2006/12/18 14:03
L6	4	5 and wavelength	US-PGPUB; USPAT	OR	ON	2006/12/18 13:56
L7	3	6 not 3	US-PGPUB; USPAT	OR	ON	2006/12/18 14:03
L8	581	(amorphous adj carbon) same (laser)	US-PGPUB; USPAT	OR	ON	2006/12/18 14:38
L9	103	(amorphous adj carbon) same (laser) same (thermal or treated or treatment)	US-PGPUB; USPAT	OR	ON	2006/12/18 14:02
L10	108	(amorphous adj carbon) same (laser) same (thermal or thermally or treated or treatment)	US-PGPUB; USPAT	OR	ON	2006/12/18 14:02
L11	75	10 and @ad<"20031003"	US-PGPUB; USPAT	OR	ON	2006/12/18 14:38
L13	32	11 and wavelength	US-PGPUB; USPAT	OR	ON	2006/12/18 14:03
L14	32	13 not 3	US-PGPUB; USPAT	OR	ON	2006/12/18 14:03
L15	31	14 not 7	US-PGPUB; USPAT	OR	ON	2006/12/18 15:42
L16	2192	(amorphous adj carbon) and (wavelength)	US-PGPUB; USPAT	OR	ON	2006/12/18 14:38
L17	1572	16 and @ad<"20031003"	US-PGPUB; USPAT	OR	ON	2006/12/18 15:45
L18	1419	17 and temperature	US-PGPUB; USPAT	OR	ON	2006/12/18 14:38
L19	219	18 and (electromagnetic near3 (radiation or irradiation))	US-PGPUB; USPAT	OR	ON	2006/12/18 14:39
L20	117	19 and (wavelength with nm)	US-PGPUB; USPAT	OR	ON	2006/12/18 14:42

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L21	8	20 and ((heat or heated or treated or treatment or expose or exposed or exposing) with (amorphous adj carbon))	US-PGPUB; USPAT	OR	ON	2006/12/18 15:32
L22	538	(amorphous adj carbon) with (anneal or annealing or (thermal adj rapid) or (thermally adj treated) or heated or heating or (heat adj treated) or (heat adj treatment))	US-PGPUB; USPAT	OR	ON	2006/12/18 15:45
L23	17	22 and (wavelength with (anneal or annealing or (thermal adj rapid) or (thermally adj treated) or heated or heating or (heat adj treated) or (heat adj treatment)))	US-PGPUB; USPAT	OR	ON	2006/12/18 15:45
L24	9	23 and @ad<"20031003"	US-PGPUB; USPAT	OR	ON	2006/12/18 16:06
L25	725	(wavelength with laser with (anneal or annealing))	US-PGPUB; USPAT	OR	ON	2006/12/18 16:04
L26	558	25 and @ad<"20031003"	US-PGPUB; USPAT	OR	ON	2006/12/18 16:04
L27	1	(wavelength with laser with (anneal or annealing)) same ((amorphoous adj carbon) or (diamond adj like))	US-PGPUB; USPAT	OR	ON	2006/12/18 16:06
L28	3	(wavelength same laser with (anneal or annealing)) same ((amorphoous adj carbon) or (diamond adj like))	US-PGPUB; USPAT	OR	ON	2006/12/18 16:06
L29	3	wavelength same (laser with (anneal or annealing)) same ((amorphoous adj carbon) or (diamond adj like))	US-PGPUB; USPAT	OR	ON	2006/12/18 16:06
L30	3	29 and @ad<"20031003"	US-PGPUB; USPAT	OR	ON	2006/12/18 16:30
L31	2	30 not 27	US-PGPUB; USPAT	OR	ON	2006/12/18 16:10
L32	392	(laser near3 (anneal or annealing)) with wavelength with nm	US-PGPUB; USPAT	OR	ON	2006/12/18 16:10
L33	307	32 and @ad<"20031003"	US-PGPUB; USPAT	OR	ON	2006/12/18 16:15
L34	138	33 and carbon	US-PGPUB; USPAT	OR	ON	2006/12/18 16:29
L35	105	(amorphous adj carbon) with (anneal or annealing)	US-PGPUB; USPAT	OR	ON	2006/12/18 16:29

L36	93	35 and @ad<"20031003"	US-PGPUB; USPAT	OR	ON	2006/12/18 16:30
L37	31	36 and (wavelength with nm)	US-PGPUB; USPAT	OR	ON	2006/12/18 16:31
L38	31	37 not 34	US-PGPUB; USPAT	OR	ON	2006/12/18 16:31

DOCUMENT-IDENTIFIER: US 20020055012 A1

TITLE: Optical data recording medium

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Application Filing Date - APD (1):
20010710

Detail Description Paragraph - DETX (4):
[0016] Heat measurements of hydrogenated amorphous carbon via Modulated Differential Scanning Calorimetry (MDSC) show that the hydrogenated amorphous carbon decomposes and releases hydrogen at a temperature of about 350.degree. C. Moreover, **annealing** (heat treatment) of the hydrogenated **amorphous carbon** shows that a significant change in the hydrogen content of the hydrogenated **amorphous carbon** occurs when **annealing** proceeds at a temperature greater than 300.degree. C. For instance, the hydrogen content of the hydrogenated **amorphous carbon** changes from 32.78 atomic percent hydrogen to 31.88 atomic percent hydrogen after **annealing** at a temperature of 300.degree. C. for 1 hour, and changes to 25.33 atomic percent hydrogen after annealing at a temperature of 375.degree. C. for 1 hour.

Detail Description Paragraph - DETX (9):
[0021] Preferably, the thus formed optical data recording medium has a reflectivity greater than 40% in response to a **wavelength** of from 300 to 900 **nm** so as to meet the CD or DVD standard.

Detail Description Paragraph - DETX (13):
[0024] A recording layer of hydrogenated amorphous carbon with a thickness of about 100 nm was formed on a polycarbonate substrate via plasma assisted chemical vapor deposition techniques by decomposition of a hydrocarbon with a pressure of 20 to 400 milli-torrs and a substrate bias voltage of 400 volts. The thus formed recording layer contained 5 to 60 atomic percent hydrogen. The plastic substrate was held at a temperature of about room temperature during the formation of the recording layer. A reflective layer of aluminum with a thickness of about 50 nm was subsequently formed on the recording layer. The assembly of the substrate, the recording layer and the reflective layer was irradiated with a laser beam that has a pulse laser energy density in a range of from 105 to 172 mJ/cm.sup.2 with a pulse width in the range from 50 to 300 nanoseconds and a **wavelength** of 660 **nm**. Contrast ratios in reflectivity of the

assembly at the position where the recording layer was irradiated were measured for different pulse laser energy densities. The contrast ratio was calculated as follows:

Claims Text - CLTX (10):

9. The optical data recording medium of claim 1, further comprising a reflective layer formed on said recording layer such that said optical data recording medium has a reflectivity greater than 40% in response to a **wavelength** of from 300 to 900 **nm**.

Claims Text - CLTX (12):

11. The optical data recording medium of claim 10, further comprising a reflective layer formed on said recording layer such that said optical data recording medium has a reflectivity greater than 40% in response to a **wavelength** of from 300 to 900 **nm**.

US-PAT-NO: 6103305

DOCUMENT-IDENTIFIER: US 6103305 A

TITLE: Method of forming a stress relieved amorphous tetrahedrally-coordinated carbon film

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Application Filing Date - AD (1):
19991123

Drawing Description Text - DRTX (8):
FIG. 6 shows stress relaxation after 600.degree. C. **annealing** for PLD **amorphous carbon** films as a function of laser fluence.

Detailed Description Text - DETX (2):
The essence of the invention is surprisingly simple: certain **amorphous carbon** films with specific atomic structure and bonding, as described below, have very low stress (<100 Mpa), or are stress-free, after **annealing** for a relatively short period of time (typically less than one hour) at a relatively low temperature (typically less than 700.degree. C.). The ability to achieve stress-free films of this material following relatively low temperature annealing is due to a stress relaxation mechanism that is different than any other known material. In contrast, in order to activate the conventional diffusional stress relaxation in this material, the expected annealing temperature would be close to 2000 K.

Detailed Description Text - DETX (21):
The ability to obtain a stress-free film of hard **amorphous carbon** following **annealing** at modest temperatures, e.g. 600 C, is limited to those carbon films that have a distribution of activation energies for conversion of 4-fold to 3-fold that meets criterion I, stated above. **Amorphous carbon** films that have differences in their internal bonding such that criterion I is not satisfied do not fully stress relieve following thermal **annealing,** even though the bulk film properties (e.g. hardness, Raman spectra, density, etc.) may be quite similar to the a-tC films. One example of this is shown in FIG. 4. In FIG. 4(a), the time-temperature stress relaxation behavior of a typical a-tC film that meets criterion I is shown. FIG. 4(b), shows the time-temperature stress relaxation of a carbon film that was synthesized using a filtered cathodic carbon arc

process. This process uses a solid carbon target, like the PLD film, but the energies of the carbon species and the ratio of carbon ions to neutrals in the plasma is different. The resulting film is very similar in terms of hardness, Raman spectra, density, etc., however. Note that this film does not fully stress relax, even at temperatures of 800.degree. C. The N(E.sub.A) of the filtered cathodic arc film has been measured, see FIG. 5, and it is observed that it does not meet Criterion I (the integral (dotted line) only reaches about 0.05). The most noticeable difference between the N(E.sub.A) for this material and a-tC (see FIG. 3) is the lack of low activation energy barriers (below 1 eV) for the filtered cathodic arc material.

Detailed Description Text - DETX (22):

This finding does not imply that filtered cathodic arc amorphous carbon films can never be made to fully stress relax. One would need to optimize the deposition of the film until the measured N(E.sub.A) meets Criterion I, however, before full stress relaxation can be achieved. It is also not true that all PLD amorphous carbon films will meet Criterion I and fully stress relax. FIG. 6 shows a plot of the film stress of PLD **amorphous carbon** films in the as-grown state and following **annealing** at 600.degree. C., plotted as a function of the laser fluence used to deposit the film. Note that only for those films deposited with the higher laser fluences (above about 30 J/cm.sup.2) is full stress relaxation observed. Importantly, for the films deposited with the lowest laser fluence, no stress relaxation is observed following 600.degree. C. annealing.

Detailed Description Text - DETX (32):

Several experimental measurements have been performed which support the stress relaxation model as described here. The first finding is that optical absorption within the film at visible **wavelengths** is observed to increase following the stress relaxation **anneal**. Since the optical absorption at visible wavelengths is due to local absorption within networks or clusters of 3-fold coordinated carbon, this finding is indicative of an increase in the concentration of 3-fold coordinated carbon. Also, the film density is observed to decrease, which is consistent with 4-fold to 3-fold conversion. From the stress relaxation model presented here, a density decrease of greater than 0.05 g/cm.sup.3 is expected; a density decrease of 0.10 g/cm was actually observed by x-ray reflectivity. Finally, there are changes in the electrical conductivity of the a-tC films which are fully consistent with the conversion of 4-fold to 3-fold carbon as predicted by the stress relaxation model. These electrical measurements are described more fully below.